Applicant : Thomas S. Ellis et al.
Appln. No. : 10/608,702
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REMARKS

Claims 2, 4-14 and 16-22 are pending and under consideration in the application.

Prior Art Rejections

Claims 2 and 4-11 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Kaminaga et al. (U.S. Patent No. 6,257,215) in view of Shin et al. (U.S. Patent No. 6,593,404).

The Examiner has taken the position that the Kaminaga et al. patent discloses an encapsulated, overmolded and/or underfilled electrical component; that Shin et al. disclose a semiconductor device comprising particles having a platelet structure defined by opposite substantially flat and substantially parallel faces, and that it would have been obvious to one having ordinary skill in the art at the tine the invention was made "to substitute the particles of Kaminaga et al. by having inorganic fillers such as montmorillonite, as taught by Shin et al., in order to provide excellent stress cracking resistance and improve heat resistance (column 2, lines 54-56) and improve adhesion for the semiconductor package."

Upon careful review of the Examiner's arguments, it has been determined that the rejection is based on numerous factual and legal errors.

The rejection is based on the Examiner's incorrect finding that one of ordinary skill in the art would have been motivated to substitute the filler particles of Kaminaga et al. (in particular, montmorillonite) "in order to provide excellent stress cracking resistance and improve heat resistance . . . and improve adhesion for the semiconductor package." This is incorrect. The Shin et al. patent does not provide any teaching relevant to the use of fillers in general, or any particular filler, to improve heat resistance, provide excellent stress cracking resistance, or improve adhesion with a semiconductor package. The motivation needed to establish *prima facie* obviousness for a claimed invention must be found in the prior art, not in Applicants' own disclosure. Shin et al. do not teach or suggest that the particular fillers disclosed therein (i.e., mica, talc, zeolite, and montmorillonite) provide any benefit of any kind. Instead, the passage relied on by the Examiner (column 2, lines 54-56 of the Shin et al. patent) teaches that "flame retardant thermoplastic resin compositions with excellent stress

cracking resistance and heat-resistance may be produced by adding flame retardants comprising a phosphate ester and a mixture of alkyl substituted, preferably t-butyl substituted, monophosphate esters of U.S. Pat. No. 5,206,404." Thus, if one having ordinary skill in the art were somehow motivated by Shin et al. to improve stress cracking resistance of the resin encapsulants of Kaminaga et al., the person of ordinary skill in the art would add a phosphate ester, and not substitute the fillers of Kaminaga et al. with a particular one (montmorillonite) of the fillers disclosed by the Shin et al. patent.

The Shin et al. patent only discloses the use of montmorillonite as a filler, not an agent for improving stress cracking resistance, heat-resistance or adhesion. *Hawley's Condensed Chemical Dictionary, Eleventh Edition*, Van Nostrand Reinhold (1987) at page 521 (copy attached as Exhibit 1) defines the word "filler" as follows:

> (1) An inert mineral powder of rather high specific gravity (2.00-4.50) used in plastic products and rubber mix to provide a certain degree of stiffness and hardness and to decrease cost. Examples are calcium carbonate (whiting), barytes, blanc fixe, silicates, glass spheres and bubbles, slate flour, soft clays, etc. Fillers have neither reinforcing nor coloring properties, and the term should not be applied to materials that do, i.e., reinforcing agents or pigments. Fillers are similar to extenders and diluents in their cost-reducing function; exact lines of distinction between these terms and difficult, if not impossible, to draw. Use of fillers and extenders in plastics has increased in recent years due to shortages of basic materials.
>
> (2) The cross or transverse thread in a fabric or other textile structure.
>
> (3) A metal or alloy used in brazing and soldering to effect union of the metals being joined. See also diluent, extender, reinforcing agent.

The above-quoted definition for the word "filler" shows that not only does the Shin et al. patent fail to suggest that the particularly disclosed fillers are useful for improving stress cracking resistance, heat resistance and adhesion, but that fillers are not generally known for performing these functions. Instead, fillers are used for reducing cost, or providing a certain degree of stiffness and hardness.

It is illogical and irrational to be motivated to replace the filler of Kaminaga et al. with a particular one of the fillers disclosed by the Shin et al. patent based on a teaching that the

addition of phosphate esters provides improved properties. Obviousness cannot be based on the assumption that those having ordinary skill in the art act irrationally.

The rejection is also based on the erroneous finding that "Shin et al. disclose a semiconductor device." The Shin et al. patent is absolutely devoid of any mention of a semiconductor device. It is also absolutely devoid of any mention of an electrical component that is encapsulated, overmolded and/or underfilled with a resin composite material. Shin et al. does not mention any particular use for their flame retardant polycarbonate resin compositions, but disclose that others have used polycarbonate resin compositions "for parts of electrical products and automotive components because they have a good combination of transparency, high impact strength, and heat resistance," and have been "used for parts of home and office appliances." None of this suggests the disclosed flame retardant polycarbonate resin compositions of Shin et al. or any component thereof are uniquely suited for encapsulating, overmolding, and/or underfilling electrical components. One of ordinary skill in the art would not have dissected the Shin et al. patent, carved out the single disclosure that montmorillonite can be used as a filler in a flame retardant polycarbonate resin composition used "for parts of electrical products and automotive components" or "for parts of home and office appliances," and found any motivation for replacing the fused silica in the epoxy resin encapsulants of Kaminaga et al. with montmorillonite. This is demonstrated by the fact that the Examiner has relied on motivation in Shin et al. for adding phosphate esters to a thermoplastic polycarbonate composition as a basis for adding montmorillonite to a thermosetting epoxy resin composition.

Selecting montmorillonite as a filler substitute for fused silica in a thermosettable epoxy resin composition specifically formulated for encapsulating, overmolding and/or underfilling an electrical component is not motivated by the prior art. There is nothing in the prior art to suggest that montmorillonite is a suitable substitute for fused silica (the only filler disclosed by the Kaminaga et al. patent). To the contrary, Kaminaga et al. teach that "[t]he inorganic filler material . . . may be a rounded filler, such as for example fused silica, in order to reduce or minimize risks of damage at semiconductor components . . .." While there is no actual motivation in the prior art for substituting montmorillonite for fused silica in the epoxy resin composition of Kaminaga et al., those having ordinary skill in the art would have expected that

a filler having a platelet structure would be particularly unsuitable for use in encapsulating, overmolding and/or underfilling an electrical component, since a platelet structure is far removed from the desired round structure, and would be expected to cause damage. It cannot be obvious to select materials that the prior art teaches against.

The rejection is further based on the blatantly incorrect finding that "Kaminaga et al. also disclose that the organic filler particles are rounded structure particles, and wherein the rounded structure particles clearly defined by opposite substantially flat and substantially parallel faces (as recited in claim 1)." (It should be noted that claim 1 has been cancelled, and that the Examiner apparently was referring to claim 4.) Kaminaga et al. is absolutely devoid of any mention of filler particles having opposite substantially flat faces and/or substantially parallel faces. It is clear that the Kaminaga et al. patent is very strongly suggesting the use of substantially spherical particles, and is therefore clearly teaching away from the use of particles having a platelet structure.

The rejection is also based on the incorrect legal conclusion that it is irrelevant that the Shin et al. patent does not provide any teaching addressing encapsulation, overmolding or underfilling of an electrical component. This fact is extremely relevant. The materials of the Shin et al. patent are not being used for the specialized function of the semiconductor encapsulants disclosed by the Kaminaga et al. patent. Shin et al. do not provide any teaching relevant to semiconductor encapsulants, and do not teach anything relevant about the use of fillers in semiconductor encapsulating compositions. In fact, Shin et al. do not teach anything about the use or advantages of fillers, but instead only disclose that fillers and other conventional additives (thermal stabilizers, antioxidants, light stabilizers, plasticizers, pigments, dyes, and mold releasing agents) may be added, with the total conventional additive content being 0 to 50 parts by weight based on 100 parts by weight of the base resin. Shin et al. does not disclose the purpose of the fillers. These facts, rather than being irrelevant, show that the prior art does not provide motivation for the claimed invention. Fillers are conventionally employed to add stiffness and hardness and/or to decrease cost. In contrast to the vague disclosure regarding fillers in the Shin et al. patent, Kaminaga et al. teach that the type and amount of filler are both important, not for adding stiffness or hardness, and not for reducing cost, but for adjusting the linear expansion coefficient and minimizing damage. It is

highly relevant that the Shin et al. patent does not provide any teaching concerning the effect of fillers generally, and, more specifically, does not provide any teaching relevant to the effect of filler type and/or amount in compositions used for overmolding, underfilling and/or encapsulating electrical components.

The Examiner's incorrect legal conclusion that it is irrelevant that the Shin et al. patent does not teach anything about compositions for overmolding, underfilling and/or encapsulating electrical components is particularly disturbing with respect to the rejection of claim 10. Dependent claim 10 is directed to electrical components encapsulated, overmolded and/or underfilled with a composite including a thermoplastic resin matrix containing 20% or less of filler particles having a platelet structure. The rejection of independent claim 4 (from which claim 10 depends) is based on the illogical conclusion that one of ordinary skill in the art would have been motivated to substitute montmorillonite filler for the fused silica filler in the thermosettable epoxy resin composition of Kaminaga et al. because Shin et al. teach that the addition of phosphate esters provides improved stress cracking resistance and heat resistance in a flame retardant thermoplastic resin composition. With respect to dependent claim 10, the Examiner also believes that it would have been obvious to one having ordinary skill in the art at the time the invention was made to completely replace the thermosettable epoxy resin composition of Kaminaga et al. with a thermoplastic flame retardant polycarbonate resin composition of Shin et al. In other words, the Examiner is taking the position that it would have been obvious to simply use the resin composition of the Shin et al. patent for overmolding, underfilling and/or encapsulating an electrical component. Yet, at the same time, the Examiner has concluded that it is irrelevant that there is no motivation for using the thermoplastic flame retardant polycarbonate of Shin et al. for this purpose. Neither Kaminaga et al. nor Shin et al. teach or suggest that thermoplastic resin compositions are suitable for encapsulating, overmolding and/or underfilling electrical components, nor do either of these references provide any expectation that thermoplastic compositions would be suitable for this purpose. Kaminaga et al. disclose nothing about thermoplastic resin compositions, and Shin et al. disclose nothing about overmolding, underfilling and/or encapsulating electrical components. Absent a knowledge of Applicants' disclosure, the person of ordinary skill in the

art would find the teachings of Kaminaga et al. and Shin et al. to be directed to unrelated subject matter.

Based on misinterpretations regarding the teachings and relevance of the prior art, and in particular the absence of any motivation for utilizing montmorillonite as a substitute for the fused silica in the compositions disclosed by Kaminaga et al., the rejection of claims 2 and 4-11 based on the teachings of Kaminaga et al. in view of Shin et al. is erroneous and should be withdrawn.

Claims 13-14 and 16-20

Claims13-14 and 16 -20 stand rejected under 35 U.S.C. §103 as being unpatentable over Kaminaga et al. in view of Shin et al. The Examiner has taken the position that Kaminaga et al. disclose an encapsulated, overmolded and/or underfilled electrical component, that Shin et al. disclose a semiconductor device comprising a thermoplastic resin composition including an inorganic particular filler, and that it would have been obvious to one having ordinary skill in the art at the time the invention was made "to select the thermoplastic resin composition as known material, as taught by Shin et al. and the device structure of Kaminaga et al. for forming a polymeric composite, such that the thermoplastic resin would provide excellent stress cracking resistance and improve heat resistance (column 2, lines 54-56)." The Examiner has added that the selection of montmorillonite based on its known suitability as a filler supports a *prima facie* obviousness determination.

This rejection is also based on numerous errors of fact and incorrect legal conclusions.

First, as pointed out above, the Shin et al. patent does not disclose a semiconductor device. The Shin et al. patent is absolutely devoid of any mention of a semiconductor device.

Also as stated above, the Shin et al. patent does not teach or suggest that montmorillonite or any other filler is useful for providing excellent stress cracking resistance or for improving heat resistance. Instead, the Kaminaga et al. patent teaches that phosphate esters can be added to polycarbonate resin systems, not the epoxy resin systems discloses by Kaminaga et al., in order to improve stress cracking resistance and heat resistance. One having ordinary skill in the art would not be motivated to add montmorillonite filler to the epoxy resin compositions of Kaminaga et al. in place of fused silica filler, based on the fact

that Shin et al. teach that phosphate esters are useful for improving stress cracking resistance and/or heat resistance of flame retardant polycarbonate materials.

Further, the fact that Shin et al. suggest that montmorillonite may be a suitable filler for polycarbonate resins, does not suggest its suitability for use in the epoxy compositions of Kaminaga et al., which utilize round particles such as fused silica to prevent damage to electrical components during their intended use in underfilling, overmolding and/or encapsulating electrical components.

Claims 21-22

Claims 21-22 stand rejected under 35 U.S.C. §103 as being unpatentable over Kaminaga et al. in view of Shin et al. and further in view of Yu et al. (U.S. Patent No. 5,153,657). The Examiner has taken the position that it would have been obvious to one having ordinary skill in the art at the time invention was made "to select glass spheres as known material, as taught by Yu et al. into the device structure of the above combination for forming the inorganic fillers as being claimed since the glass spheres would maintain good conformance in the lateral direction (column 12, lines 31-32)." The Examiner has added that the "selection of known material based on its suitability for its intended use supported a *prima facie* obviousness determination."

Dependent claims 21 and 22 are of course allowable for the reasons set forth above. Further, Yu et al. disclose the use of glass spheres in a thermoset elastomeric matrix formed into the shape of a cleaning blade. The disclosed use of the glass sphere reinforcing filler is to "improve the blade's wear resistance and tear toughness, as well as reducing its contact friction against a charge retentive surface of an electrophotographic imaging member while maintaining good conformance in the lateral direction." Wear resistance, reduced friction, and good conformance in the lateral direction during movement of a blade across the surface of an electrophotographic imaging member is totally irrelevant to the teachings of Kaminaga et al. and Shin et al. Thus, one having ordinary skill in the art would not have been motivated to utilize glass spheres in the thermoplastic resin composition of Shin et al., or to use the modified thermoplastic resin composition of Shin et al. in place of the epoxy resin composition of Kaminaga et al. As stated above, the relevant characteristics of the Kaminaga et al. filler

(only fused silica is disclosed) is its ability to achieve a desired coefficient of thermal expansion while avoiding damage to electrical components. In this respect, the three applied prior art references are unrelated disclosures that are only tied together by Applicants' own teachings. In essence, the Examiner is arguing that since glass sphere fillers are useful for imparting certain beneficial properties to an elastomeric wiper blade, the person of ordinary skill in the art would expect that glass spheres would impart the same properties to a different resin material used in an entirely different application in which the properties beneficial to an elastomeric wiper blade are of absolutely no relevance, and in which specific properties not attributed to glass sphere fillers by the prior art are important (namely the ability to achieve a desired coefficient of thermal expansion while avoiding damage to the electrical component during overmolding, underfilling or encapsulating). Further, the prior art does not provide any teaching that would motivate one having ordinary skill in the art to utilize a thermoplastic resin for overmolding, encapsulating and/or underfilling an electrical component.

CONCLUSION

Applicants have earnestly attempted to specifically point out the numerous factual and legal errors in the rejections to assist the Examiner in recognizing that the prior art does not provide motivation for the claimed combination invention, and actually teaches against using montmorillonite in a composition for overmolding, underfilling and/or encapsulating an electrical component, and that the prior art references do not provide any motivation for using glass spheres or thermoplastic resins for encapsulating, overmolding and/or underfilling an electrical component. Upon correctly interpreting the teachings of the prior art and correctly applying the patent laws, it should be recognized that a withdrawal of all of the rejections and issuance of a Notice of Allowance is appropriate.

Respectfully submitted,

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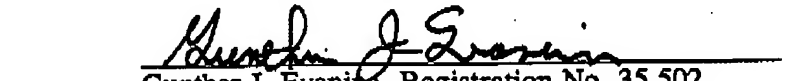
Date



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